A REPORT

The Health InterNetwork planning workshop

Held at

NTI, Bangalore, India

A Report

The Health InterNetwork Planning Workshop

Held at

National Tuberculosis Institute,
Bangalore
India

2nd and 3rd May 2002

Foundation for Research in Health Systems
6 Gurukrupa, 183 Azad Society,
Ahmedabad- India
+91-79-674 0437, 5589, 6279
frhsahdad1@sancharnet.in

07150

Community Health Cell
Library and Information Centre
367, " Srinivasa Nilaya "
Jakkasandra 1st Main,
1st Block, Koramangala,
BANGALORE - 560 034.

Abbreviations

DHO	**District Health Officer**
DOTS	**Directly Observed Treatment- Short Course**
FRHS	**Foundation for Research in Health System**
GOI	**Government of India**
HIN	**Health InterNetwork**
IT	**Information Technology**
KVA	**Kilovolt Ampere**
LAN	**Local Area Network**
LRS	**Lala Ram Swaroop TB Hospital, New Delhi**
NTI	**National Tuberculosis Institute, Bangalore**
PHC	**Primary Health Centre**
RGUHS	**Rajiv Gandhi University of Health Sciences**
RNTCP	**Revised National Tuberculosis Control Program**
TRC	**Tuberculosis Research Centre, Chennai**
UPS	**Uninterrupted Power Supply**
VPCI	**V Patel Chest Institute, New Delhi**
WHO	**World Health Organization**

Summary and salient features of the workshop

About 40 participants, all potential beneficiaries of the project attended the HIN-Planning workshop at the National Tuberculosis Institute (NTI), Bangalore. After the inaugural session, HIN Project Manager briefly described the HIN- India Pilot Project. After this presentation, FRHS presented highlights of the Information Needs Assessment Survey carried out in two project states. Issues identified in the survey were further explored during discussions in the next session. Participants then observed that in addition to creating the Content, HIN should also focus on influencing attitudes of the health staff towards work and use of information for solving problems.

Thereafter various Information Technology options such as the Internet, CD-ROM and Palm-top, their roles in the HIN, as well as their relative merits and de-merits, were presented. Possibility of combining these technologies in the HIN seemed to appeal to most participants except perhaps to health workers, who had a feeling that information technologies would not help improve health services.

In the next two sessions, participants were divided into four groups. Each group identified a set of important TB and Tobacco related problems that have information solutions. They then listed specific situations when they would normally encounter those problems, the type of information they would need to solve those problems and their preferred media for receiving that information.

This exercise showed that though the type of information need depended to some extent on the type of problem, the most frequently mentioned information need was for government policies and guidelines. And the most preferred media was Newsletter. In the open discussion that followed, the participants mentioned that their real need was also for quick transfer of information i.e. quick transfer of patient records in case of referred patients and quick transfer of program statistics from field to district and state levels.

In the next session, the four groups developed work plans for the HIN project and presented those plans in the plenary session on the following day. Each group had dealt with different aspects of the project. One group developed action plan for the Resource Institutions. Another developed a plan for project management. The third group prepared an action plan for implementing the project at the 12 project sites while the forth group suggested a set of actions to strengthen support services and to ensure sustainability of the project.

Some of the major actions suggested by these groups were:

- Procure only certified systems and software from the locally placed vendor with AMC (Annual Maintenance Contract).

- Training should be imparted starting with use of basic Office Software, Internet browsing, searching, exchanging mails as well as accessing and using HIN Website.

- Content contribution to the HIN Website should be restricted to selected persons and institutions. However, a process should be put in place for individuals and institutions other than those given access rights, to upload content or to make suggestions for uploading content. The content to be uploaded should be reviewed by content selection committees composed of experts from the research institutions, control institutions and professional institutions. The number and geographical spread of each committee should be large enough to make this a simple and efficient process.

- Relevance of the contents would be judged by their research rigor and scientific merit and not be restricted to any guidelines such as the RNTCP.

- Selected persons from each nodal TB research institutions will be trained to review content. Each of the nodal institutions would designate persons responsible for creating/ populating databases and electronically publishing content. They will be provided the requisite training for this purpose.

- For ensuring sustainability after the HIN project, it was hoped that the amount could be met out of PHC's regular budget. Participants discussed possibilities of generating funds beyond the HIN for example, by providing information access to students for a fee.

- For evaluation of the HIN-India Pilot phase an end-evaluation survey would be carried out to assess the changes in access and use of research information.

- The project should also institute Process Monitoring that would involve qualitative assessment of Content, Connectivity and Capacity Building. An agency should be appointed to systematically undertake Process Monitoring, to regularly visit the project sites, find out their practical difficulties and provide help in resolving them. This step would help improve effectiveness of the Pilot phase as well as provide guidance for future expansion of the HIN.

Workshop Participants

On May 2-3, HIN-India in collaboration with Rajiv Gandhi University of health Sciences, Bangalore and the Foundation for Research in Health Systems, Ahmedabad, organized the HIN-Planning workshop at the National Tuberculosis Institute (NTI), Bangalore. About 40 participants, all potential beneficiaries of the project attended this workshop (Appendix 1). They included health providers from primary health centers, a few private doctors, state and district level health officers from Bangalore and Orissa, and representatives from four resource institutions – NTI, Tuberculosis Research Center (TRC), Chennai, LRS Hospital (LRS), New Delhi, and Vallabhbhai Patel Chest Institute (VPCI), New Delhi.

The workshop began with Dr. Suryanarayana, acting Director of the NTI, welcoming the Chief guest Dr Chandrasekhar Shetty, Vice Chancellor of the Rajiv Gandhi University of Health Sciences (RGUHS). In his speech, Dr. Shetty voiced his concern about the medical community not addressing public health issues to the desired extent. He also stressed the need to involve people in health programs, including HIN. Medical professionals must be socially accountable, he said and congratulated the HIN project for bringing Government and WHO together on this issue.

HIN-India Objectives

Next, Mr. Ranjan Dwivedi, HIN Project Manager briefly described the HIN- India Pilot Project (Attachment 2). After his presentation, many participants wanted to know how HIN could ensure health workers' involvement in the project. "*Many health workers do not perceive Primary Health Center's problems as their problems. Therefore they do not take interest in solving these problems, either by finding information or otherwise. If success of HIN depends on improving health staff's capacity to find solutions to their problems, then this is a great challenge*", some participants remarked.

Highlights of the HIN Needs Assessment Survey

Following Mr. Dwivedi's presentation, Dr. Vikas Aggarwal presented highlights of the Information Needs Assessment Survey, carried out by the Foundation for Research in Health System in two project states (Attachment 3).

Though by and large, participants agreed with most of the survey findings, they made two pertinent observations. First, some participants wondered whether what respondents called their "information need" was really their "felt need"? If it was, then how could one explain that most government doctors wanted information but did not read even Indian Journals? Two possible explanations they offered for

this anomaly were (i) doctors either do not really need information or (ii) they do not trust Indian Journals. If they really do not need information, how can IT and Computers help? They asked.

Their second observation was that the survey had not captured the role of medical representative as information source for doctors. "*Everyone knows that medical representatives are the main source of technical information for doctor. How would HIN compete with that source? How would we ensure that doctors trust HIN over medical representative*?" They asked.

This and other issues were further discussed in the following session, which was led by Dr. Balasangameshwara, a faculty member from NTI (Appendix 4). In this session two findings received the most attention

(1) Why 1/3rd of government doctors would not use the Revised National Tuberculosis Control Program (RNTCP) regimen for treating private patients though they would use it for treating patients in government health centers? Is it because they lack conviction or they lack support for implementing DOTS strategy? The survey should have probed further into this aspect, they pointed out.

2) Why very low reported use of Indian medical journals? Is it because most Indian journals are not peer-reviewed hence doctors suspect authenticity of their content. Some participants argued that doctors are really not interested in getting technical information because that is not the criteria for their promotion. In that case, HIN should not focus just on creating content but also on influencing their attitude towards technical information. Some participants suggested measures such as providing them case studies and sharing positive experiences that would prompt them to seek more information. After the HIN provides connectivity, which would respond to queries raised by health providers promptly and accurately? Participants asked

Technology for Meeting Information Needs

After the discussion on Information Needs Assessment, Dr. Rajesh Nair and Mrs. SL Chinnappa of Indegene, presented various Information Technology options for accessing information such as the Internet, CD-ROM and Palm-top, how those would be used in the HIN, and their relative merits and de-merits (Appendix 5). The three technology options they discussed were:

Web based information via Internet: Almost all information requirements envisaged by users can be met by this option, they said. Users can have access to

Government documents, reports, research data, case studies & success stories. They can keep in touch with experts & colleagues, have access to journals and also know what is happening elsewhere in the world. For example, accurate drug information can be given over the Net, which would reduce doctors' dependence on Medical representatives.

CD-ROM as desk reference: This is a preferred medium for interactive audio-visual teaching and for updating knowledge. The same information available via Internet can be made available on CD-ROM, as desk reference. On CD-ROM, one can have access to complete proceedings of national & international conferences, and seminars that doctors find difficult to attend because of cost & time factor. One can even have reference books on CD-ROM.

Personal Digital Assistants (PDA)/ Plam top Computers /Simputers: They then demonstrated the use of PDA in the field for data collection and subsequent updation of data, and as a quick reference and information tool.

Possibility of combining these technologies in the HIN seemed to appeal to most participants, except to health workers. Health workers present at the workshop, said that information technologies would not help them. They are not able to reach services to people because they have no mobility. There is shortage of staff so the existing staff has to provide services in much larger areas than it is humanly possible. Workers are busy with too many programs and activities. On top, they also have too much paper work -- reports to prepare and registers to maintain. Unless information technology solves these problems for them, it cannot help improve services.

Group Discussion on Problem Identification

In the next session, four groups were formed to identify important problems related to TB and Tobacco control programs that might have information solutions. To facilitate problem identification process, participants were provided with a few examples of problems that were identified during the Information Needs Assessment survey. They then listed several problems that they thought were important. This exercise lasted for an hour, after which each group presented its problem-list.

In the next session, each groups was asked to identify likely situations when they. would encounter those problems, as well as what type of information they would need and in what form, to deal with those problems..

The likely situations they identified were: while interacting with patient, during supervision or technical briefing, during village visits, during research and while developing policy or program guidelines.

The types of information options they used were, research information (R), expert advice (E), government guideline (G), case studies (C).

The media options they used were, the Internet (I), CD-ROM (C), Journals (J), Newsletters (N). Training (T) etc. Table (1) summarizes the problems they identified; types of information they needed and their preferred media.

Table1: HIN Plan: Priority Problems, Preferred sources of Information and Media

Questions / Problems	Preferred Sources of information	Percentage respondents reporting need of information in following probable situations				
		Media	While with patients	At Meetings/ Technical briefings	During Village visit	Doing Research
1. What to do if TB symptoms are present but sputum microscopy is negative?	G	J/N/T/C	72	41	38	14
2.What to do if a patient is not taking drugs regularly?	G	J/N/T/C	83	35	45	12
3. What to do if there is no cure despite the full course of drugs?	G	J/N/T/C	17	72	6	41
4. How to bring down the chances of side effects	G/R	J/N/I/C	45	52	27	50
5. Update on the drug resistance to decide when to change the therapy?	R/E/G	I/J/N/E/C	17	79	3	62
6. What are pharmacological implications of the combination therapy for TB?	R/E	I/J/N/E/C	10	55	6	69
7. Are nutritional supplements a must for all patients?	R/E	I/J/N/E	52	55	30	31
8. What are possible interactions of TB drugs with the food?	R/D	J/N	52	48	14	48
9. In case a patient has liver diseases, what change to make in TB therapy?	G/R/E	J/N/I/E	48	72	10	41
10. Is there is any interaction between ART for HIV and DOTS drugs?	R/D/G/E	J/N/I/E/T	14	55	7	66

Source of Information: R – Research findings, E – Experts advice, S – Success stories, C – Case Studies, D– Data, G – Government Policies/Guidelines

Types of Media: I- Internet portal, E- email, e-News, C- CD ROM, J- Journals, D- Document, M- Meeting/Seminars, T- Training, P- Posters, N- Newsletter

Table1 contd.: HIN Plan: Priority Problems, Preferred sources of Information and Media

Questions / Problems	Preferred source of information	Percentage respondents reporting need of information in following probable situations				
		Media	While with patients	At Meetings/ Technical briefings	During Village visit	Doing Research
11. What are the areas on which TB patient should be counseled?	C/S	N/P/D/T	58	52	41	3
12. How to diagnose the cases of extra pulmonary TB?	G	J/N/P/C/I	27	66	0	34
13. What role could doctors from Indian System of Medicine play in TB Control?	C/S	J/D	0	45	3	72
14. How to increase detection rate with inadequate health staff?	C/S/E	N/I/E	17	72	45	0
15. How to reduce the defaulter rate?	C/G/S	N/J/I	70	76	38	10
16. What changes in lifestyle should one recommend to a TB patient?	C/R	N/J/I	76	58	38	3
17. Government guidelines on RNTCP are not accessible to all workers	G	N/P/I/E	10	83	24	17
18. How to increase TB / Tobacco awareness in the general population	C/S/D	P/D/N	34	76	58	14
19. How to strengthening health services, especially at the grass-roots level	C/G/S	I/N/T	3	96	41	14

Source of Information: R – Research findings, E – Experts advice, S – Success stories, C – Case Studies, D– Data, G – Government Policies/Guidelines

Types of Media: I- Internet portal, E- email, e-News, C- CD ROM, J- Journals, D- Documents, M- Meeting/Seminars, T- Training, P- Posters, N- Newsletter

Table1 contd: HIN Plan: Priority Problems, Preferred sources of Information and Media

Sources of information	Preferred source of information	Percentage respondents reporting need of information in following probable situations				
		Media	While with patients	At Meetings/ Technical briefings	During Village visit	Doing Research
20. Different doctors give different TB drugs to patients, which confuses them.	S/D/E	I/E	17	79	30	7
21. How to deal with relapse cases?	G/R/C/S	J/N/I/T	62	72	14	30
22. What should be the treatment for contacts of TB cases?	G/R	J/N/T/I/E	45	72	14	30
23. What are safe methods for collecting and disposal of sputum?	G/C	I/C/P	79	52	27	25
24. How to improve the quality of sputum examination and when sputum is less	G	T/P	86	52	17	58
25. What is the rate of smoking among school children? How it can be reduced?	C/S/D	I/E/C/N	65	72	62	17
26. What are the effects of (active and passive) smoking in pregnancy?	R/C/S/D	J/N/I/E/C	89	68	52	21
27. What different forms of tobacco uses are prevalent in different region?	D	I/N	79	68	68	31

Source of Information: R – Research findings, E – Experts advice, S – Success stories, C – Case Studies, D– Data, G – Government Policies/Guidelines

Types of Media: I- Internet portal, E- email, e-News, C- CD ROM, J- Journals, D- Documents, M- Meeting/Seminars, N- Newsletter, T- Training, P- Posters

This exercise showed that though their information need somewhat depended on the problem they faced they most frequently needed information about government policies and guidelines. This information "type" was mentioned in respect of 15 out of 27 problems. The next two types of information mentioned were Research (11) and Case studies (11).

In the open discussion that followed this Group Exercise, participants identified additional problems, which had to do with quick transfer of information. Foe example, one problem they mentioned was when patients get referred or transferred to other doctors, their treatment information does not reach the new doctors promptly. That delay results in changes in treatment and confusion for patients. HIN should help in quickly transferring patient information from one doctor to another, they suggested. Another problem they mentioned was flow of program statistics. Some participants suggested that quick flow of data from field to central level and equally rapid feedback would help in program management. However, health workers expressed apprehension about that suggestion. "In that case our work will increase. Someone looking at our data would be asking too many questions", they said.

In the next session the four groups developed work plans for the HIN project. They presented those plans in the plenary session on the second day of the workshop. Each group had developed plans for different aspects of the project, based on guidelines given to it.

Group 1, dealt with the topic Planning for Resource Institutions. This Group's guidelines included:

- Identify key information providers
- Describe intended users (national and international)
- Establish selection criteria for ensuring quality, relevance and importance \
- Establish processes, policies and principles for making different types of content available.

This group was given five content areas as the basis for preparing the plan. These areas were: (1) Data/ Health Information/ Statistics, (2) Health Policies and practices, (3) case studies, (4) IT tools such as e-mail and e-news and (5) Distance learning. Table 2 summarizes the plan for the resource Institutions (Group-1's plan).

Table 2: Plan for the Resource Institutions

Content Area	Information providers	Users	Selection Criteria for Selecting Information	Process and principles to ensure availability
1. Health Information: Morbidity, mortality, cure rate, default rate etc.	Health care providers at all levels including private practitioners National and state level program managers, Research institutions	Program Managers above the level of District Medical Students (PG) students Teachers Researchers	Data to be selected based on RNTCP Guidelines Ensure cross checking of data as recommended in RNTCP Periodic evaluation of the information system	Segment data area wise Involve some institutions like: NTI, TRC to
2. Health Policy and practices	RNTCP, SSC, SR Guidelines	Health care service providers both government and private	RNTCP	
Scientific publications	Journals from: Medical Libraries Institutions Scientific Societies Research Institutes	Medical staff Students Researchers Policy makers	Publications from Peer-reviewed journals and Web-sites of NTI, TRC, LRS, VPCI. Regional expert committees in each research institution to review other publications such as thesis, reports etc.	HIN Website to provide links to all TB related web-sites The four TB research institutions to ensure that their librarians use international codes in their respective web-sites

Table 2 contd.: Plan for the Resource Institutions

Content Area	Information providers	Users	Selection Criteria for Selecting Information	Process and principles to ensure availability
Case studies, Diagnostics	Experiences of various stakeholders	Service providers Students Researchers Policy makers	Approval of the regional expert committee	Up-loading of content will be done from one of the regional institutions Selected institutions and individuals will have permission to up-load.
IT tools such as e-News or e-mails	Any person who wishes to contribute problem, discussion point, case studies, success stories etc.	All HIN beneficiaries	HIN regional expert committees would work out some kind of filter mechanism for such information	
Distance learning	Institutions like the LRS that have distance learning program	Service providers	Institutions' criteria	

Group 2 developed plans for Program Managers, for successfully implementing the project. This plan involved specifying various actions that project managers would have to take. These included identifying potential users at each site, ensuring their training, monitoring use of computer facility and promoting beneficiary interest in the project. This group's Actions Plan is summarized in Table 3.

Table 3: Action Plan for Program Managers

Planned actions	Group 2's Suggestions
Identify health personnel at each site as potential users of HIN.	At each selected site, program managers will nominate at least three persons, one medical officer and 2 paramedical staff as potential users of HIN. The persons selected must be residing at the center and willing to acquire computer skill. They should be willing to participate in the project. Potential beneficiaries will be asked to provide specific amount of time each day in their daily activity schedule, for HIN activity.
Ensure that users are trained and are able to access information.	NIC staff will provide training to the potential users, on computers and at the project sites, so that there will be no gap between training and use of the computer. Some staff with better skills will be trained to assist others in case of problem.
Ensure that HIN facilities are used as intended and not misused	Ensure that the computer facility is located in a place where it is accessible to all users. There should be a computer program to log the time each user has spent in accessing information. Manager will monitor the amount of Internet connection time used per month. Manager would find out which web-sites the user has visited to assist in ascertaining the pattern of information seeking.
Ensure prompt corrective action for computer related problems or problems with supplies like paper, cartridges etc.	The service contract with supplier should include a guaranty of 24-hour repair service. Each project site will receive a year's supply of paper, floppies, cartridges etc. along with the computer. District NIC personnel will visit each site once a month to solve difficulties, sweep hard disks for virus, provide any help needed to send and receive information.
Make arrangements for networking among various stakeholders – from field workers to research institutions.	Project managers will monitor queries sent by the field staff to various stakeholders such as district and state level officers, experts, research institutions, and the response rates to those queries. Initially, project officer should organized meetings of selected stakeholders with the health staff at NTI to facilitate communication among them.
Create interest and promote enthusiasm for this project	To create enthusiasm and interest in the project, project managers will try out innovative ideas such as giving reward for the best question mailed to researchers. Giving visibility to HIN participants in monthly meetings by asking them to present some new information to their colleagues, etc.

Group 3 prepared a project implementation plan at the 12 pilot sites.

Bangalore rural district -Karnataka state	**Deogarh district -Orissa state**
Kanakpura taluk hospital	District health office, Deogarh
Doddamaralawadi PHC	Barkote CHC Kundheigola PHC New
Sathnur PHC	Bamparda PHC
Bidadi PHC	Tileibani PHC
Tubagere PHC	Chhatabar PHC
Doddahejjaji PHC	Kansar PHC New
District Tuberculosis Office	Kandhal

Group 3 had the data from e-readiness survey carried out at these sites. Using that data this group listed specific actions that were needed at each site.

For example, the survey had shown that all 12 sites had adequate physical space available for setting up computer systems. But half of those sites had no staff capable of using computers. Therefore, the first task Group-3 identified for site preparedness was identifying suitable persons at those sites for training under HIN. Table 4 summarizes this and all other actions suggested by Group 3.

Table 4: Planning For Site Preparedness

Activity	Centers in need	Time Taken	Persons Responsible	Remarks
Identification of suitable person for training	Doddamaralawadi, Tubeger, Burkote, Bamparda Teleibani	4 weeks	State government/ DHO	Transfer of staff should be avoided
Internet training	All Centers	15 days	Project	NIC centers
Purchase of hardware, UPS, hand-held vacuum cleaner	All Centers	3 months	Project	Local vendor preferred
Telephone lines	4 centers	1 month	State government	Administrative delays should be avoided
Appointment of a nodal person for the project	All centers	--	DHO	Nodal officer should not be transferred

Group- 3 also observed that:

Though 5 out of 12 sites had no "dust free" environment, no physical alteration were needed at those sites. Instead, hand-held vacuum cleaner should be provided to each site (12 nos.) to keep computers clean. Each would cost approx. Rs. 4000. Also there should be computer covers to protect computers from dust, when not in use.

Because of the frequent electricity outage problem at all sites, the group suggested providing UPS (Uninterrupted Power Supply) at each site with 2-3 hours backup power supply using truck batteries. This would be an inexpensive solution to this problem, which would cost about Rs.10,000/-

Only 3 out of 12 sites had phone lines while all others needed telephone lines. DHO should seek state government help to get telephone lines or VSAT links as the case may be. A separate dedicated telephone line was not required but PHC would need budget to pay for telephone bills.

11 out of 12 sites needed hardware and also adequate supply of papers, cartridges etc. Also training that should minimally include Windows OS, Use of MS-Word and Internet, Email. Since PHC staff cannot afford to give one full week for this training, the training period may have to spread over 2 weeks.

Group 4 prepared a plan for providing Support services that were needed for smooth functioning of HIN project. This group considered such services as training, hardware-software support, arrangements for trouble shooting, online help to the users, as well as new IT options such as Simputers to be tried out in the project.

Group-4 suggested that:

- The project should procure only certified systems from the locally placed vendor and should enter into AMC (Annual Maintenance Contract) for the proper maintenance of system. Also, it should include the procurement of licensed software from recognized vendors.

- The project should eventually consider providing the Intranet facility to connect all PHCs over a LAN for immediate advice of medical experts. However, at present this suggestion would not be practical.

Training, hardware – software support, trouble shooting.

- Training should be imparted from the basics of computers till the Internet browsing. Training should be organized locally, to be given to all persons involved in the project -- from PHC staff to experts

- Refresher's course should be introduced to let health provider know the parts of the computers to some extent and to have a better knowledge of computers

- At least a Pentium-III system needs to be provided with an EPSON printer along with 1 KVA UPS. A window air conditioner may desirable but not necessary for functioning of the computers.

- All systems should be provided MS-Office; Norton Anti-virus software and customized health related software. The anti-virus software installation is a must for protecting systems from virus attacks.

- All users should be taught to trouble shoot simple problems like connect the various parts of a system, switching on and off the system properly, and functions of UPS.

Online help to the users

- Health providers can seek online help for their problems using the HIN network by browsing, exchanging mails and video-conferencing. They can access any journals, Newsletter or can also consult experts or seniors in emergency cases. The project must make sure that some one would respond to those queries.

- Health providers must be trained in how to access information hosted on the Web-sites, how to chat online, how to search specific contents and how to exchange mails.

- They should also be taught to upload their case studies and success stories on the net, for fast and easy retrieval by other users.

Exploring new options in the IT field

- Data reporting will be faster and easier if the network connectivity is established eventually among PHC and district offices, from district offices to the State etc. This will ensure data uniformity.

- Updating data using Active Server Pages would be ideal for online updation of data.

- SIMPUTER, means Simple, Inexpensive, Multi-lingual Computer, can be used for secure data collection since SIMPUTER allows relatively straight forward development of customized form – based data collection programs.

- The simputer costs only Rs.9, 000/- and consumes very low power. This devise should be tried out, initially to capture information about TB patients on treatment. But instead of giving SIMPUTER to field workers who are very busy, they should be given to lab technicians or pharmacists to enter patient records.

Improving quality of surveillance data

- Validation checks must be provided, to check the correctness of data, thus ensuring that a quality data is maintained.

- A data entry module needs to be developed with various validation checks on the data, ensuring quality of data.

Discussion of the Project plans

After the four groups presented their respective plans in the plenary session, participants discussed mainly three issues: content creation, capacity building and sustainability.

Content Creation

All participants unanimously agreed that availability of relevant content was key to the success of the project while information technology issues though important, were secondary. The following decisions were taken with respect to Content Creation:

Electronic publishing of research:

It was agreed that the major research institutions for TB (NTI, VPCI, TRC, and LRSITBA), control institution (TB control Unit) and Apex professional institutions (TB Association of India) will make their research available on-line. The HIN project will support the required training of the personnel in these institutions for this purpose.

In case of the research from other institutions and individuals (researchers, subject specialists, Medical College teachers), the NTI will be responsible for choosing the appropriate content (for its relevance and authenticity), indexing it and electronically publishing the same.

As for uploading the content on a central data base of the national health research system, the consensus was that content contribution should be restricted to selected persons and institutions but any individual or institutions can seek permission to upload content. There would be a national level expert committee to address only the process issues of uploading the content. Each of the four nodal TB research institutions (NTI, TRC, LRS, VPCI) would review contents and give permission to upload information, in their respective regions.

How to decide relevance of the contents? Who will decide the relevance? What criteria should be used to decide the relevance?

One predominant view was to use RNTCP guidelines for deciding relevance of the content. Some people however felt very strongly that that should not be the only criteria. Views criticizing RNTCP guidelines are also relevant. Therefore, the only criteria for deciding relevance should be "the content is based on proper research or not".

Some people expressed apprehension that insisting on technical review might discourage flow of anecdotal information or innovative ideas from health provider or NGO. Participants agreed that such material should not be discouraged but should be classified separately from peer reviewed content.

Given the overwhelming recourse to Program guidelines for information, it was decided that the HIN project should support:

1. Making Program guidelines easily available for off-line viewing by installing them of their hard disks, or making them available on CD ROMS.

2. Program guidelines should be periodically updated as new versions come into effect.

3. Frequently Asked Questions (FAQ) section should be available to users, which should be constantly updated on the basis of the queries raised. The NTI could use its training programme feedback and also its contact in the field for this purpose.

4. The guidelines should be made available in the local language, especially for the benefit of health workers.

In addition to the guidelines, reference was often made to research institutions as an important source for information and for query resolution. For this purpose, it was recommended that quick and easy to use structured system should be evolved for referring problems/queries directly from Field to Research Institutions. The LRSITBAD and VBPCI, being centers combining treatment with research, accepted the role of responding to such problems/queries within a specified time

period. Representatives of these two institutes agreed to have a dedicated team to attend to these queries. The HIN Project would provide them the requisite support for application deployment and robust Internet connectivity.

At the district and sub-district levels, the personnel are multi-functional. Hence for the project to succeed at that level, information provided to them must also be comprehensive and multi-faceted. Accessing information only on one or two diseases by using the Internet technology might not be enough of an incentive for them to invest their time and effort in this project. Hence the HIN should also try to cater to their other health information needs. One step in this direction could be to make a relevant variation of the WHO "Blue Trunk Library" available to them, which is easy to refer and customize to the local needs.

Capacity Building for Content Creation, indexing and e-publishing.

Participants suggested that selected persons from each institution must be trained for reviewing content to be used to populate the HIN Website. Each of the nodal institutions namely NTI, LRS, TRC and Patel Chest Institute, would designate persons in their respective institutions who would be responsible for creating/populating databases. They will be trained in international indexing and content creation and electronic publishing. The Project should support the required training, as also any training/ capacity building needs identified later.

Sustainability

During the project period, each PHC needs to be provided adequate budget for consumable such as computer paper, floppies, CDs, payment of telephone bills etc. HIN would provide a specified amount per PHC, for this purpose. But after the project, it was hoped that that amount could be met out of PHC's regular budget. Participants discussed possibilities of generating funds beyond the HIN. One possibility for example, was to provide information access to students for a fee. Another was to use HIN facilities for reporting data of other health programs, like the RCH, which would have funds beyond the one-year life of the HIN. Dr. L.S. Chauhan, Deputy Director General (TB) mentioned about Government of India's plan to connect all PHCs with the center. Facilities provided under the HIN could become an integral part of that plan, which will ensure their sustainability.

Monitoring and Evaluation

In the final session, participants briefly dealt with arrangements for monitoring and Evaluation of the project. Dr. Murthy outlined a "monitoring and evaluation" plan, which involved conducting baseline and end-evaluation surveys to gather data on access and use of research information, before and after the HIN. FRHS had already carried the baseline survey. A similar survey would be repeated at the end of the project, approximately one year from now.

In addition, she presented some ideas for Process Monitoring of the project, which involved periodic assessment of Content, Connectivity and Capacity Building—the three major components of the project (appendix 6). ***Content monitoring*** would involve periodic gathering of beneficiaries' views on whether the HIN portal is providing high-quality, current and relevant information and providing that feedback to agencies responsible for Content Creation.

Connectivity monitoring would involve ensuring that the Internet connectivity has been established and is functioning satisfactorily. Each pilot site would be visited regularly to find out if the computer system is in use, skill training has been adequate and maintenance arrangements are working.

Monitoring of Capacity Building would focus on finding out whether HIN is helping beneficiaries to use information in their daily work. For example, this monitoring would involve finding out how different stakeholders view utility of health research information provided through the HIN; identifying practical difficulties that beneficiaries encounter in accessing information; as well as assessing usefulness of e-linkages and physical networks established between research institutions, administrators and practitioners.

The participants broadly approved this plan. Unfortunately the time was too short to allow its full discuss. However, some participants stressed the need to undertake Process Monitoring in view of the fact that HIN-India is a pilot project. "*To help future expansion we need to learn from implementation problems, practical difficulties and how those get addressed*", some participants remarked. They suggested that there should be a separate agency for undertaking Process Monitoring. That agency should develop methodology and indicators for Process Monitoring to be approved by the Advisory Committee.

Process Monitoring should gather as much descriptive data as possible, reflecting beneficiaries' views and feelings, by periodically visiting all sites and not by asking PHCs to send in reports. Also, problems identified during Process Monitoring must be resolved otherwise this monitoring would serve no purpose.

Appendix 1: HIN Workshop Participants

Dr. L.S. Chauhan
Dy. Director General (TB)
Room No.522, 'C' Wing,
DGHS,
Nirman Bhavan
New Delhi – 110 011
3018126
M-98116-02957
ddgtb@nb.nic.in

Dr. Anjali Chotray
Joint Director (TB)
Dept. of Health & Family Welfare,
Bhubhaneshwar
0674-410010
Fax-410010
M-98610-21760

Dr. O. Panigrahi
Head of the Department
Associate Professor
SPM Medical College,
Burla
0663-431941

Dr. Rohit Sarin
Assistant Medical Superintendent
LRS TB Hospital, New Delhi
011-6517831
Fax-6518227
drsarin@yahoo.com
drsarin@hotmail.com

Dr. Ruben Samuel
WHO Consultant (Orissa)
UN House-II
256 Forest Park
Bhubaneshwar
0674-534755/
850/851
M-98610-37803
Ruben.Samuel@undp.com
Ruben_Samuel@yahoo.com

Dr. H.N. Patnaik
Deputy Director
State Institute of Health & Family Welfare,
Bhubhaneshwar
0674-403336
M-98610-10672
sihfw1@sancharnet.in

Dr. Gochayat
ADMO PH
Deogarh
06442-26383
Fax-26484

Dr. Vijayan V. K.
Director
VP Patel Chest Institute,
New Delhi
011-7666180
M-98112-03966
vijayanvk@hotmail.com

Dr. Santhadevi Thottikkamath
Deputy Director
Tuberculosis Research Centre (TRC)
Major VB.R.Ramanathan Road
(Spurtank Road)
Chetput,
Chennai - 31
044-8205600
modeldots@vsnl.com
santha_sethu@yahoo.com

Dr. Sujatha C
Medical Consultant
S1 Govardhan Apartments,
Old No. 11, Dr. Ranga road,
Mylapur,
Chennai - 4
044-4671283
4611024
sujatac@vsnl.com

HIN Workshop Participants

Dr. Prasad
WHO Consultant (TB) (RNTCP)
741/1 13th Cross,
7th Block,
Jayanagar,
Bangalore
080-6766971
M-98441-63959
prsadk@tbcindia.org
prsadkn@indiatimes.com

Dr. Ravindra H. R.
RNTCP Consultant WHO
1673,27th main road,
HSR layout, Sector-2
Bangalore-560034
080-5721679
M-98451-71035
hrreddy@vsnl.net
reddyyr@tbcindia.org

Mr. R.K. Raju
CEO
Bangalore Rural Zilla
Panchayat,
Kempegowda Road,
Bangalore
080-2260796
2263353
M- 98451-14306
Ceo_brur@kar.nic.in
dio@brural.kar.nic.in

Dr. Nagappa
District Health & Family Welfare
Officer
Dept. of Health & FW Anandrao
circle,
Bangalore
080-2876586
drnagappa@rediffmail.com

Dr. R.A. Vijayavardhan
District TB Officer
District TB Office,
Jayanagar
General Hospital Campus,
Bangalore
080-6530633
6639588

Dr. R. Narasingappa
Taluk Health Officer
General Hospital,
Doddaballapura Taluk,
Bangalore Rural District
7622141
3410926

Dr. Z.A. Masood
Taluk Health Officer
Taluk Hospital,
Kanakapura Taluk,
Bangalore Rural district.
6585331

Mrs. Mona Marathe
Specialist - System Integration
CMC Limited, Mithra Tower
10/3,
Kasturba Road, Bangalore - 560
001
2272425
mona@blr.cmc.net.in

HIN Workshop Participants- Resource Persons

Mr. Ranjan Dwivedi
Project Manager
Health InterNetwork India Project,
WHO
Delhi
011-4366375
Fax-4366115
M-98105-05068
dwivedir@whoindia.org

Dr. D.K. Srinivas
Consultant
Rajiv Gandhi University of Health Sciences,
Jayanagar
General Hospital Campus,
Bangalore

Dr. Rajesh Nair
Managing Director
Indegene Life Systems Pvt. Ltd.
080-2270892
5524314/24
rajesh@indegene.com

Dr. Balasangameshwar
CMO
National Tuberculosis Institute,
Bellary Road, Bangalore
080-3441192/93
Fax-3440952
vhbs@vsnl.com

Mrs. Sudha Murthy
Senior Librarian
National Tuberculosis Institute,
Bellary Road, Bangalore
080-3441192/93
3360338
Fax-3440952
ntiindia@blr.vsnl.net.in

Dr. R. Urs
Chief Librarian
Rajiv Gandhi University of Health Sciences,
Jayanagar General Hospital Campus,
Bangalore

Dr. Nirmala Murthy
President
Foundation for Research in Health Systems,
356 I E Cross, VI Block, II Phase,
Banashankari III Stage,
Bangalore - 85 080-
6720135, 6723937
frhs@vsnl.com

Mrs. Sitalakshmi Chinnappa
Consultant
Indegene Life Systems Pvt.Ltd.,
130 I Cross, 5th Block,
Koramangala, Bangalore – 95
080-2270892, 5524314/24
slc@indegene.com

Dr. L. Suryanarayana
Director
National Tuberculosis Institute,
Bellary Road, Bangalore
080-3441192/93 Fax-3440952
ntiindia@blr.vsnl.net.in

Dr. Vikas Aggarwal
Foundation for Research in Health Systems,
Ahemadabad
079-6740437
frhsahdad1@sancharnet.in

Mr. Unni Krishnan
Chief Statistical Officer
National Tuberculosis Institute,
Bellary Road, Bangalore
080-3441192/93
kpuk_u@rediffmail.com

Mr. Deepak K. Dhongde
Foundataion for Research in Health Systems,
Ahemadabad
079-6740437
0241-326236
frhsahdad1@sancharnet.in

HIN Workshop Participants

Kanakapura taluk hospital
Ms. Mary Greeba
LHV
Taluk Hospital, Kanakapura
Taluk, Bangalore Rural Dist.
7522485

Mr. R.C. Narayan Gowda
Lab. Technician
Satanur PHC, Kanakapura taluk,
Blore Rural District
7562595

PHC Bidadi
Mr. Sadashiva
Leprosy worker
Ramanagara Taluk,
Blore Rural Dist.
7271977

PHC Tubagere
Dr. M. S. Mamata
Medical Officer
Doddaballapura Taluk,
Blore Rural Dist.
8566795

Tubagere PHC,
Mr. Nagarajaiah D.
Senior health assistant
Doddaballapura Taluk, Blore
Rural Dist.
7624920

PHC Doddahejjaja
Mr. D. K. Kariyappa
Junior health assistant
Doddahejjaji PHC,
Doddaballapura Taluk, Blore
Rural Dist.
7732278, 7655375

PHC Satanur
Dr. V.H. Jayaram Gowda
Medical officer
Satanur PHC, Kanakapura taluk,
Blore Rural District
3416651

PHC Bidadi
Dr. Rukmini S. G.
Medical officer
Ramanagara Taluk,
Blore Rural Dist.
7282443 –R
M-98450-67289
Bidadi PHC

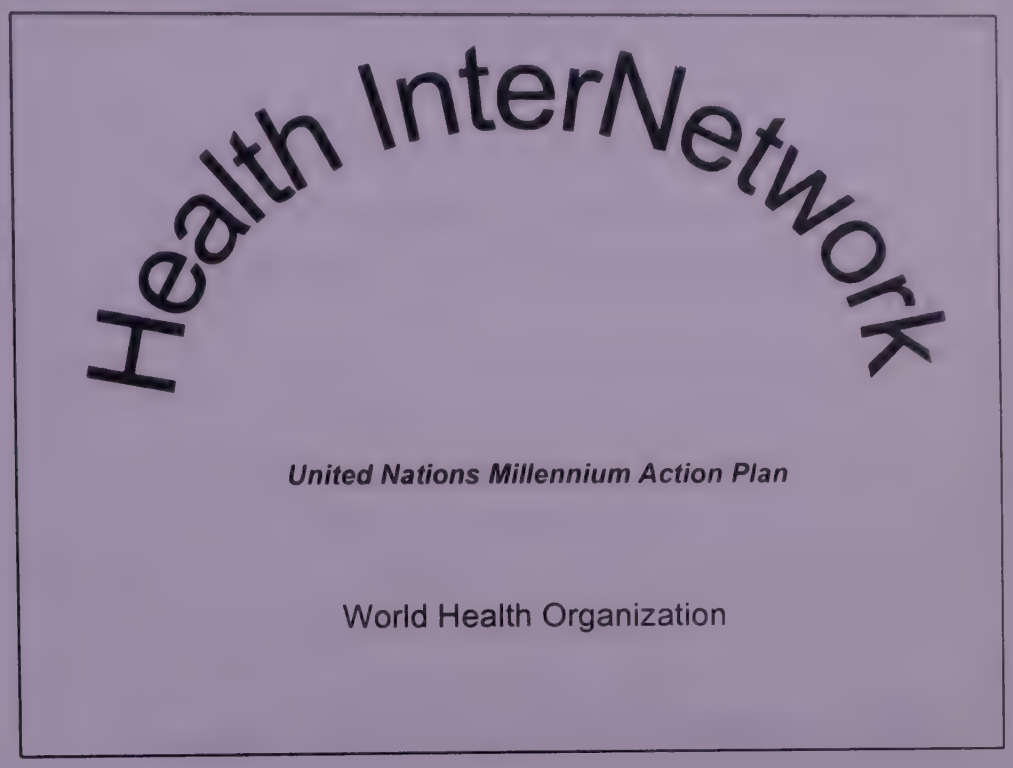
Ms. V. Martheen
ANM Bidadi Urban
Ramanagara Taluk,
Blore Rural Dist.
7282609
6751770

PHC Tubagere
Mr. S. S. Prakash
Pharmacist
Doddaballapura Taluk,
Blore Rural Dist.
7654088-PP

PHC Doddahejjaja
Dr. Kamalamma T.
Medical Officer
Doddahejjaja PHC,
Doddaballapura Taluk, Blore Rural
Dist.
8600022

Private practitioners
Dr. T.N. Vijayakumar
Director
Kanaka Nursing Home,
J.C. Extension, Kanakapura,
Bangalore
7522271, 7522326

Appendix 2: Presentation on Health InterNetwork –India Pilot Project



We the Peoples: The Health InterNetwork

a concrete demonstration of how we can build bridges over digital divides, I am pleased to announce the Health InterNetwork

...This network will establish... 10,000 on-line sites in hospitals, clinics and public health facilities throughout the developing world. It aims to provide (tailored) access to relevant up-to-date health and medical information..."

Kofi Annan: 'We the Peoples'- The Role of the United Nations in the 21st Century :Millennium Report

Health InterNetwork: Goals

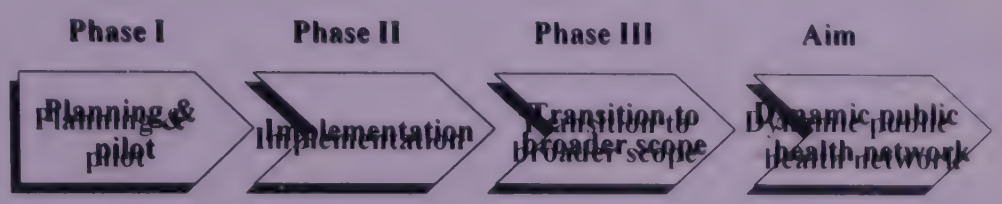
Use internet technologies to strengthen public health service by:

- Better access to high quality information
- Easier consultation among decision makers
- Faster data collection and deeper analysis

Health InterNetwork: Cornerstones

- Relevant and authentic content via Internet
- Build Capacity of institutions that process information
- Internet connection
- Training to access and use information

Health InterNetwork: Phases



Three phases over 7+ years:

- 6-12 month planning and development
- 1-year pilot operation & evaluation
- 5-year transition to broader scale

Aim: Dynamic public health information network at country and international level.

HIN Content Categories

Statistical data *Numerical information sets*	**Scientific publications** *Peer-reviewed publications and their indexes*
Health policy and practice *Reports, guidelines etc.*	**IT health applications** *ICT tools for public health*

Education and training

The Problem

Technology gap - widening gap between rich and poor (*Digital divide)*

Scarce resources in developing world

Dilemma: All Money for direct care - or some on technology to enhance overall effectiveness.

HIN India Pilot Description

Support priority public health programme

TB and Tobacco Control Programs

1. Creating network of
   - Service providers at all levels
   - Research institutions/ medical colleges/ libraries
   - Policy makers
2. Improve relevance and utilisation of research information.
3. Build capacity of institutions to provide information.

COMMUNITY HEALTH CELL LIBRARY

Project Activities

- Define representative set of users
- Identify needs
  - Information
  - Training
  - Computer and communication equipment
- Identify information
- Facilitate development of Information
- Facilitate making information available on computer and over internet.

Strengthening Institutional Capacity

- Networking of Medical Libraries
- National Health Research Information System

Strengthening Libraries

- Make available full text of Indian journals electronically
- Make available holding of libraries on the internet
- Share library resources- easy and quick availability of articles
- Increase availability of international journals (Consortium)

National Health Research Information System

Database on

- Research on all health topics
- On-going bio medical research projects
- Web site
- Researchers / scientists / sites / protocols guidelines etc.

Accessible over the internet

Pilot sites

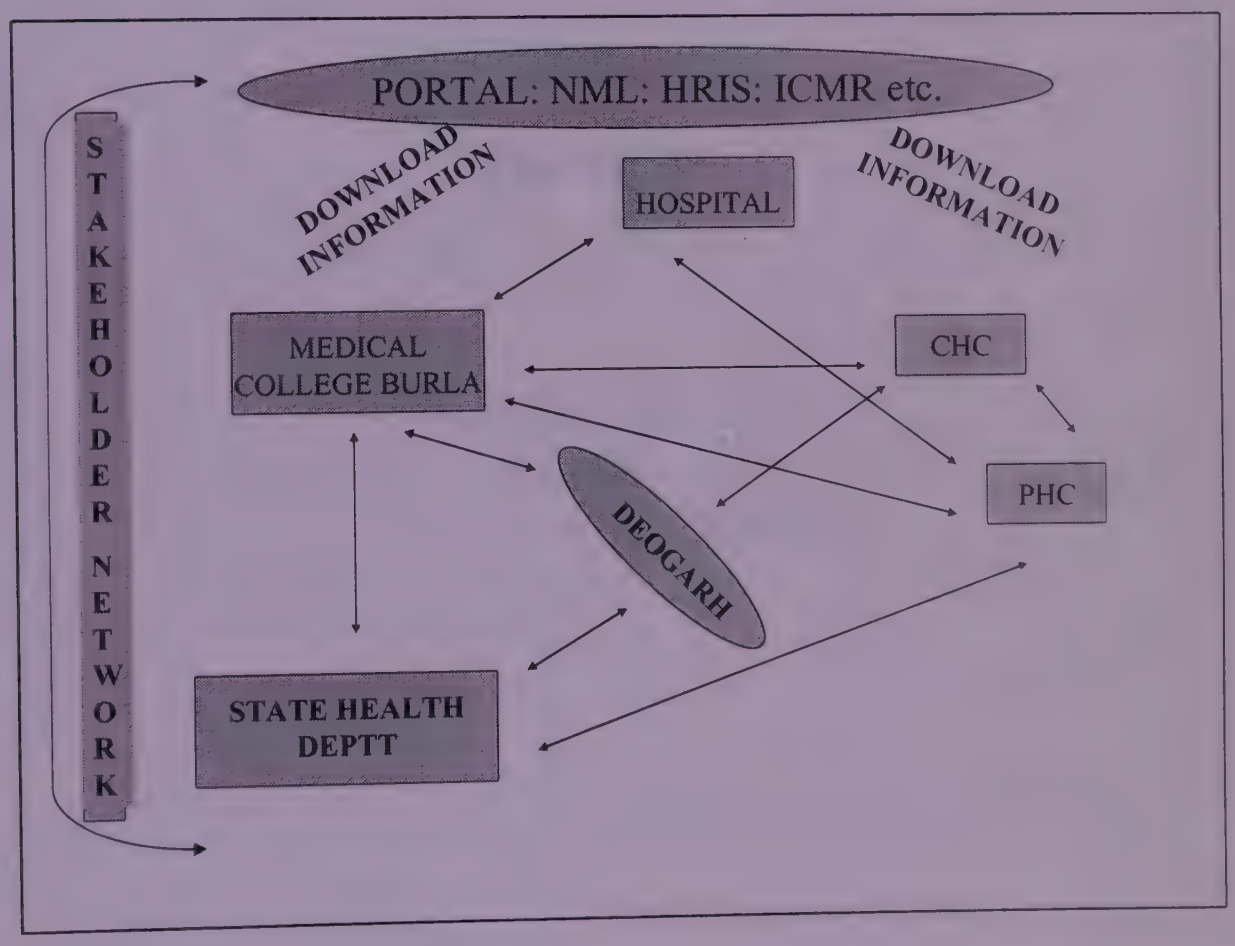
National Institutions- Control, treatment and research

States: Karnataka; Orissa

Districts: Bangalore Rural, Deogarh

Sub District: Six CHC/ PHC in each pilot district

Libraries: NML (Delhi); Burla; Cuttuck; Bangalore; Mysore



Challenges

- Identify and solve important problem
- Locally relevant content –local language issues
- Create / sustain user networks
- Convergence with other initiatives
- Keeping focus on people and problems – seeing technology as a tool

Thank You

dwivedir@whoindia.org
www.hin.org.in
Phone +91 9810505068

Appendix 3: Health Information Need Assessment Survey Findings

Health Information Needs Assessment

The Survey Results from the Pilot Sites of Health InterNetwork (HIN) Project

Need Assessment Survey

To identify information needs of the main beneficiaries,

- Administrators/ policy makers
- Researchers
- Health care service providers
  - Medical Doctors-
    - Government,
    - Private
  - Paramedical Staff

Need Assessment Survey

e-Readiness

Availability of

Space

Skills

Hardware

Electricity

of the pilot sites

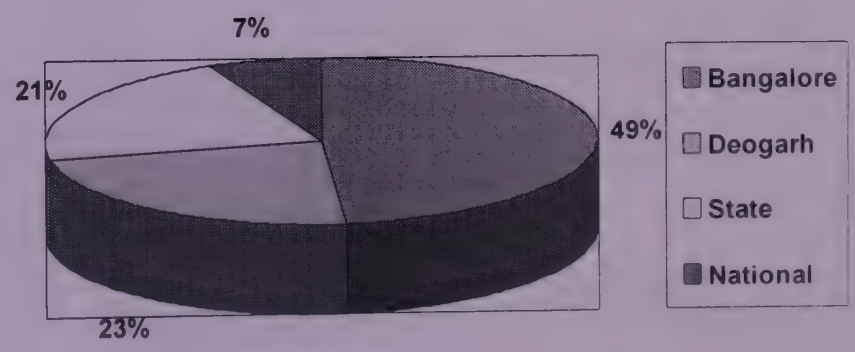
Survey Area:

- Three blocks of **Rural Bangalore** district namely, -
  - **Doddabalapur,**
  - **Kanakapura,**
  - **Ramanagar**
- Three blocks of from **Deogarh district** of Orissa,
  - **Barkote,**
  - **Riyamal**
  - **Tileibani,**

Sampling Technique

- Selection of Block Random
- Visited the block hospital, CHC and PHCs
- Interviewed all available doctors, 2 paramedical persons, laboratory technician and pharmacists, if available
- Contacted equal number of private doctors

Total number of respondents



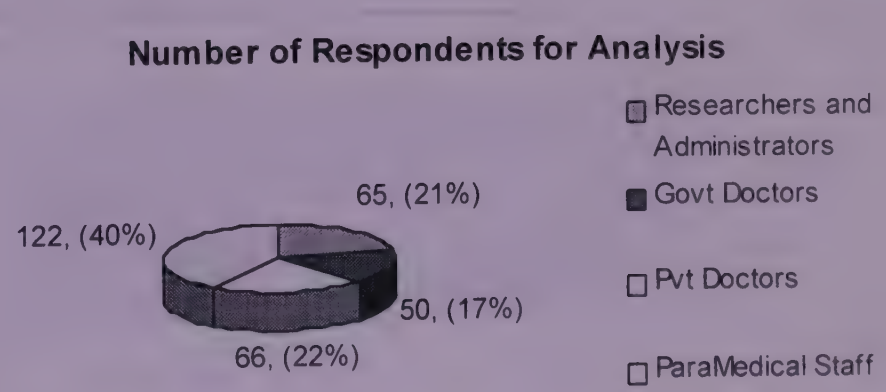
Total sample size - 303

Data Collection

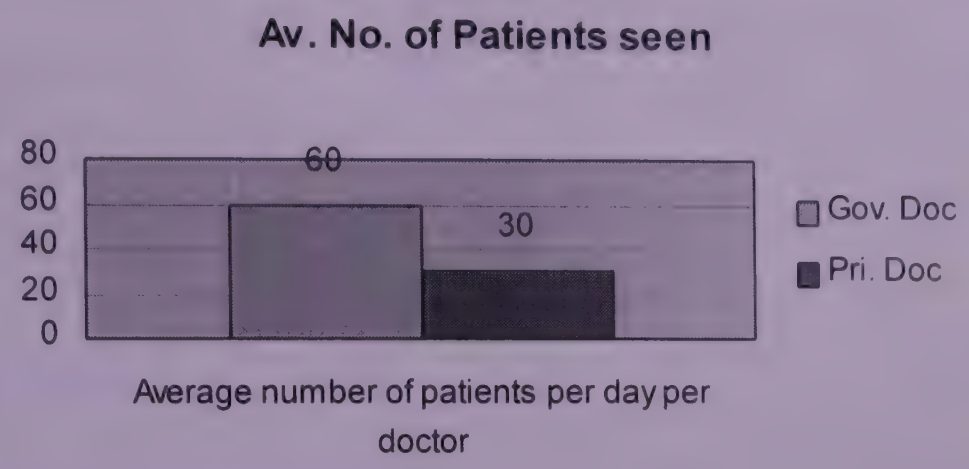
- Interview Schedules – Eight
- Seven for different categories of respondents-
  - Administrators,
  - Researchers and Faculty Members,
  - Government Medical Officers,
  - Private Practitioners,
  - Multipurpose Health workers,
  - Pharmacists,
  - Laboratory Technicians
- Eighth was e-readiness schedule

Data Analysis

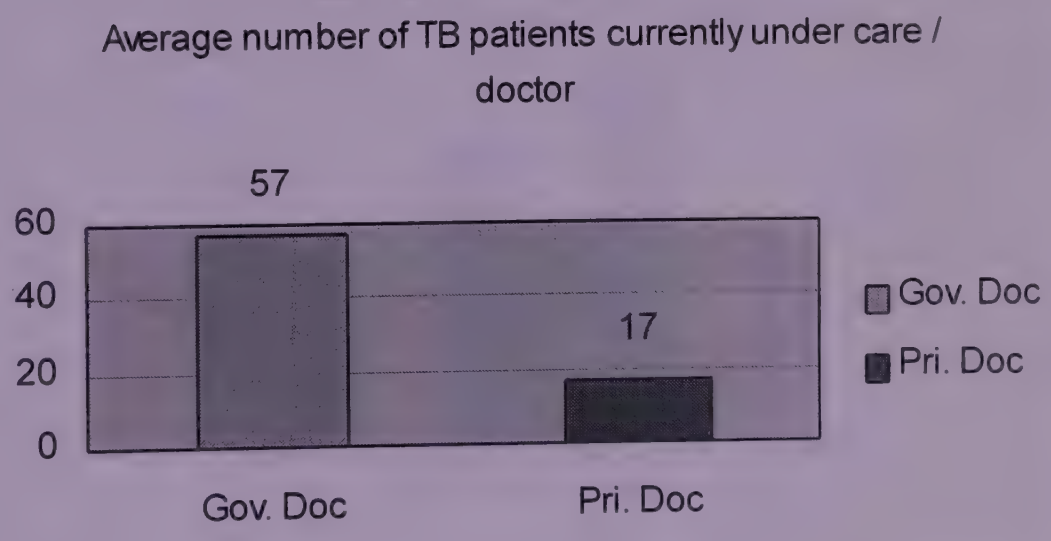
- Categorized respondents into Four categories Administrators & Researchers clubbed into 1



Patient Care Comparison



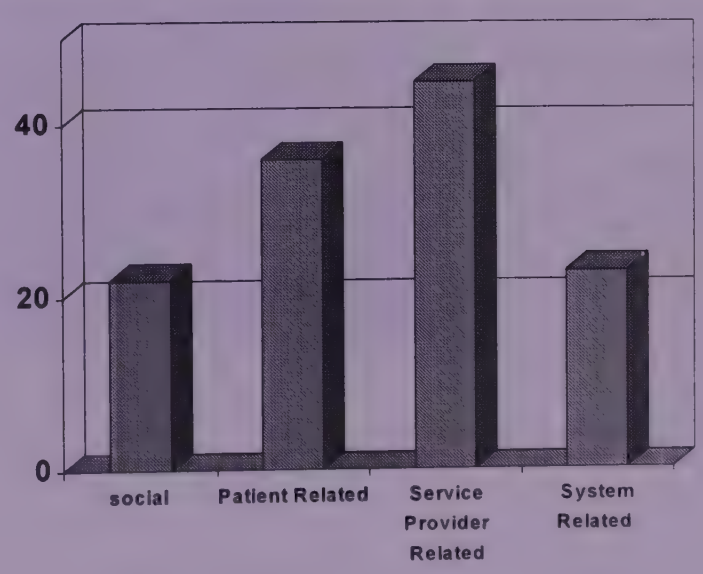
Patient Care Comparison



Awareness about the TB burden Among Respondent Groups (in %)

Characteristics	Admin. Researchers	Government doctors	Private Doctors	Paramedic staff
Sample Size (N)	***65***	***50***	***66***	***122***
% perceived TB a major public health Problem	86	92	80	43
% knew India's share in global TB Burden	37	20	17	7
% thought TB to be a "killer disease"	72	84	77	55
% knew number of people dying due to TB in India	25	38	3	6

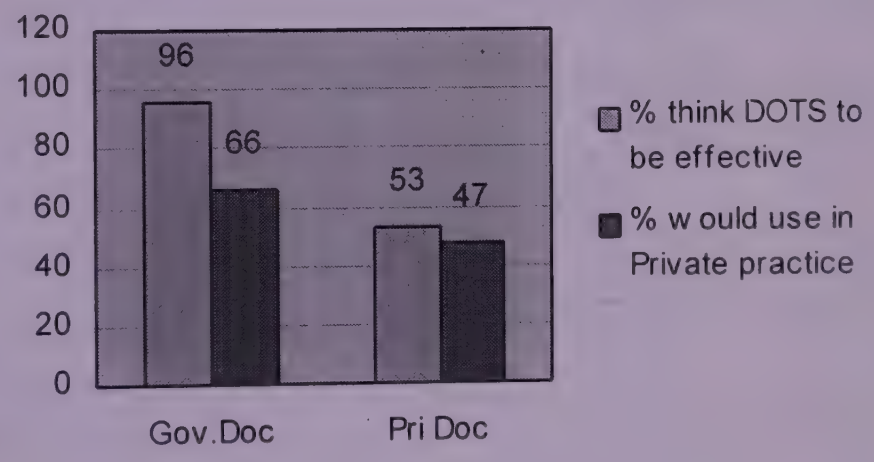
Reasons – Why TB as a Killer Disease?



Knowledge about the RNTCP Guidelines

	Admin/ Researchers	Govt. doctor	Private Doctor	Paramedic staff
Number of Respondents	65	50	66	122
% Used RNTCP guidelines for suspecting TB	NA*	84	77	87
% had heard of DOTS	95	94	58	76
% Knew DOTS features Sputum microscopy for diagnosis	91	94	56	76

On DOTS effectiveness and Usage



Access to Technical Information

	Admin/ resch	Govt Doc	Pri Doc	Paramed
Number of Respondents	*65*	*50*	*66*	*122*
% reported access to Technical Information related to TB	Not asked	36	48	34
% knew of any study on how to reduce tobacco use in a community	18	4	5	2

Sources of Technical information among those who reported having access

	Govt. doctor	Private Doctor	Para medics
Number of Respondents	18	32	42
Medical Journal	17% ☜	63%	0%
Training, meetings, seminar, conferences	33%	28%	52%
IEC, Mass media	0	3%	60%
Libraries, Books etc.	11% ☜	9% ☜	7%
Internet, Websites, etc.	17%	19%	0

"No Access to Medical Journals".

- Reported by

40 % govt. doctors

25 % private doctors

How Do They Most Commonly Use New Information (In %)

	Administrator Researchers	Gov. doctor	Private doctor	Para medics
Number of respondents (N)	***65***	***50***	***66***	***122***
For diagnosis, treatment,	21	39	48	35
For policy and program decisions	21	13	8	3

Respondents reporting need for TB and Tobacco Information

	Admin/ resch	Govt. doctor	Private Doctor	Paramedics
Number of Respondents	**65**	**50**	**66**	**122**
% reported need for TB information	60	68	98☜	97
% Reported need for information related to Tobacco use	86	98☜	100☜	84

Types of information Needed in TB and Tobacco

	Adminis/ Resch	Govt. Doc	Private Doc	Para med
How to prevent spread of TB	**0**	**62**	**69**	**69**
How to motivate patients	**0**	**79**	**62**	**52**
Etiology of TB☜	**13**	**26**	**35**	**46**
New developments in TB ☜	**69** ☜	**9**	**11**	**1**

Current Source of Information

Type of Information	Admin/Resch	Govt Doctor	Pri Doctor	Paramed
Awareness in area of expertise	Journals	Journals	Journals	Meeting
In-depth in the area of expertise	Journals	Journals	Journals	Books

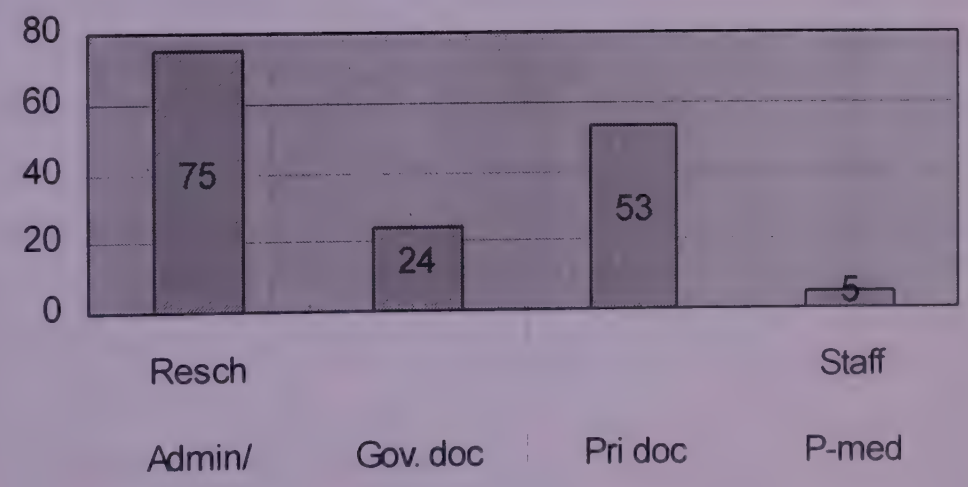
Three Most Frequently Reported Difficulties in Accessing Information

In-depth information in the area of Expertise				
	Admin/Resch	Govt Doctor	Pri Doctor	Paramed
"No Difficulty"	26%	30%	27%	30%
3 frequently mentioned Difficulties	Difficult to get	Difficult to get	Expensive	Difficult to get
	Irregular	Expensive	Difficult to get	Not up-to-date
	Expensive	Irregular	Irregular	Not locally relevant

Preferred method of reaching information (in %)

	Administrator/ Researchers	Gov. doctor	Private doctor	Paramedical Staff
Number of respondents (N)	*65*	*50*	*66*	*122*
Internet and email	82	78	82	52
Newsletters or fact sheets	68	68	77	69
Verbally from experts	42	62	67	75
Scientific journals	75	82	94	53
AV media such as CD, DVD	62	74	76	80

Percentage Reporting Access to Internet

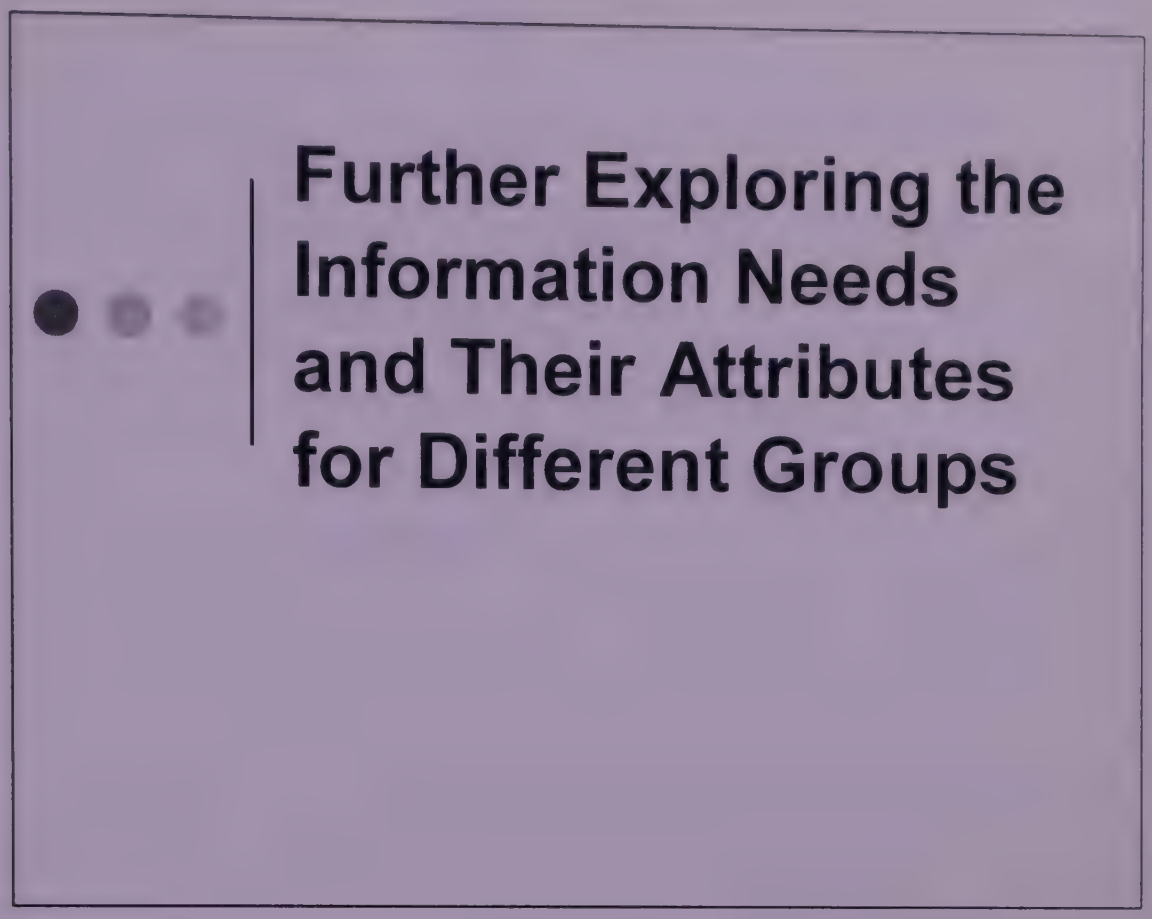


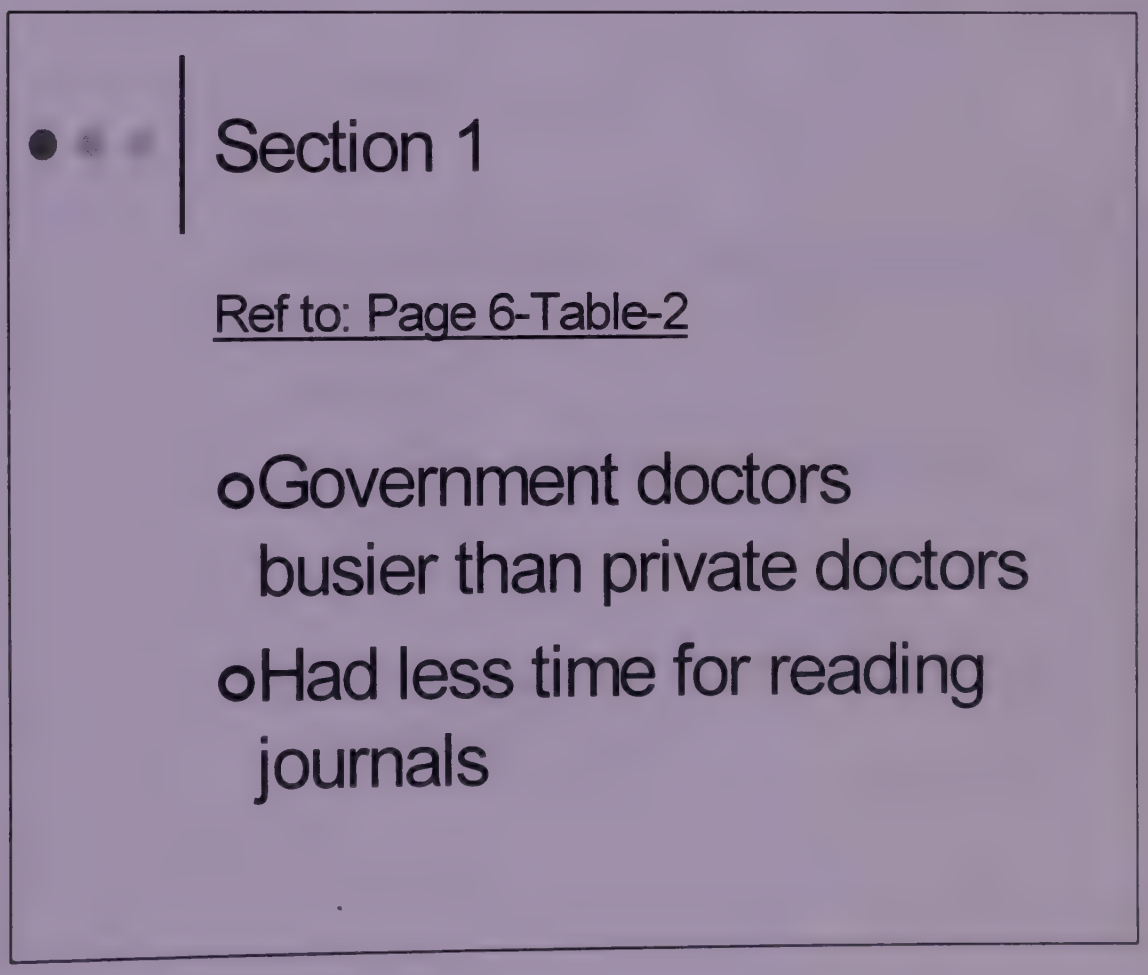
E- readiness of the Pilot Sites

E-readiness parameters

Physical Conditions	Yes	No
Adequate physical space for hardware	23	3
Appropriate Site temperature Moderate-21; Low-5	17	9
Dust-free Environment	17	9
Frequent electricity fluctuations ☜	7	19
Frequent electricity outages	13	13
Generator available ☜	1	25
Earthing for electricity connection available	26	0
Fixed telephone lines available ☜	7	19
Internet Access available ☜	1	25
Computer training facility in the vicinity ☜	3	23

Appendix 4: Further Exploring Information Needs





Section 2

Ref to: Page-6

- Epidemiological information, particularly,
  - Magnitude of problem - morbidity and mortality for general

Section 2 …

- Private Practitioners – Knowledge regarding
  - RNTCP
  - DOTS - less than government doctors
- What media will they like to have information from?

Section 2…

- Why do government doctors not use DOTS in their private practice?
- What is individually tailored treatment?
  - It is no confidence in drugs used?
  - Is it dosage - is it perceived higher?
  - Is it individual drugs Vs combined drugs?

Section 2…

- NTI studies on
  - Success stories related to TB Control
  - Reasons for default

RH-12-0

Section 2…

- Monitoring and report of performance
  - What about general practitioners - would they like to know?
  - How should it be presented?
  - Present tables may be reviewed and asked their reaction.

Section 3

- How would respondents like to know…
  - Research studies?
  - New development?

Section 3…

- How to prevent spread - not clear, need proof?
  - Is it sputum disposal?
  - Is it family contact?
  - Is it counseling - marriage, job?

Section 3….

Etiology of TB - What information is needed?

Page- 15, Table-14

- Accessing information - Doctors
  - Difficulty ? Means what - No Library, far off?
  - Irregular ?
  - Expensive - is it journal cost?
  - Not relevant?

Appendix 5: Technology Options

There are three technology options available

1. Web based information via Internet

This can meet almost all the information requirements envisaged by users.

Users can have access to Government documents, reports, research data, case studies & success stories as news items, keeping in touch with experts & colleagues, journals and also what is happening elsewhere in the world. Via Internet which is a powerful and useful medium.

If accurate drug information is given over the Net the dependence on Medical Representatives can be avoided

The same information can be made available on CD-ROMs as desk reference too.

2 CD-ROM

CD –ROM is the preferred medium for interactive audio visual teaching and updation of knowledge, have complete proceedings of national & international conferences, seminars etc on ones desk, since these are a difficult to attend due to cost & time. One can even have reference book, collection on CDs.

3 Palm Held Computers

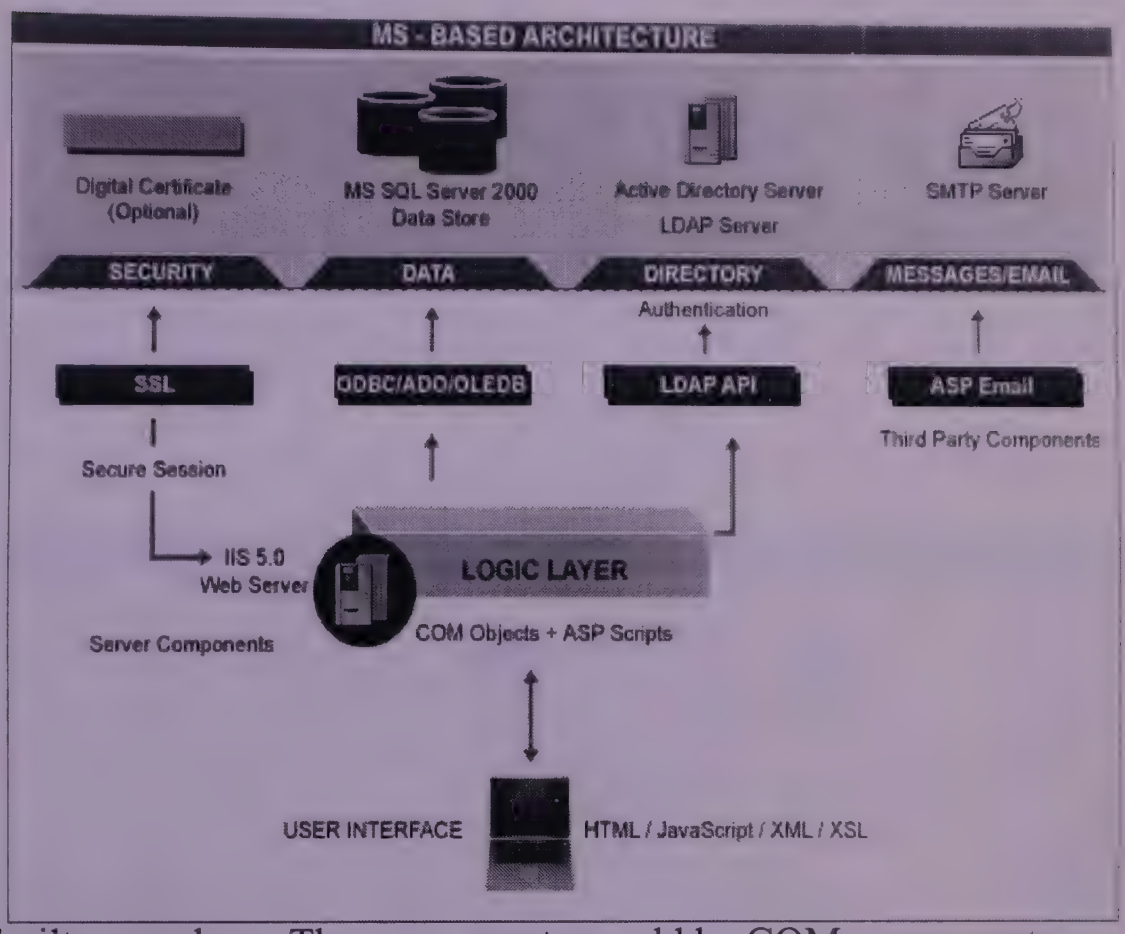
Simputers are useful in the field for data collection for later updation, and as a quick reference information tool.

The basic technology architecture would have the following objectives

- *Scalability and extensibility*
- *Ease of use*
- *Uniform management of users, applications and resources*
- *Performance*
- *Reliability*
- *Access to multiple data stores*
- *Survive technology and organizational changes*

A set of data stores will hold the data required and used by the applications. Business logic is implemented as a set of component based applications. A User Interface server handles all user interactions. These UI server implements scripted user interfaces and generate content in HTML and XML as required. The rigid separation of business logic from presentation devices and backend data stores gives flexibility of reuse.

In our approach, it is assumed that all the applications would be

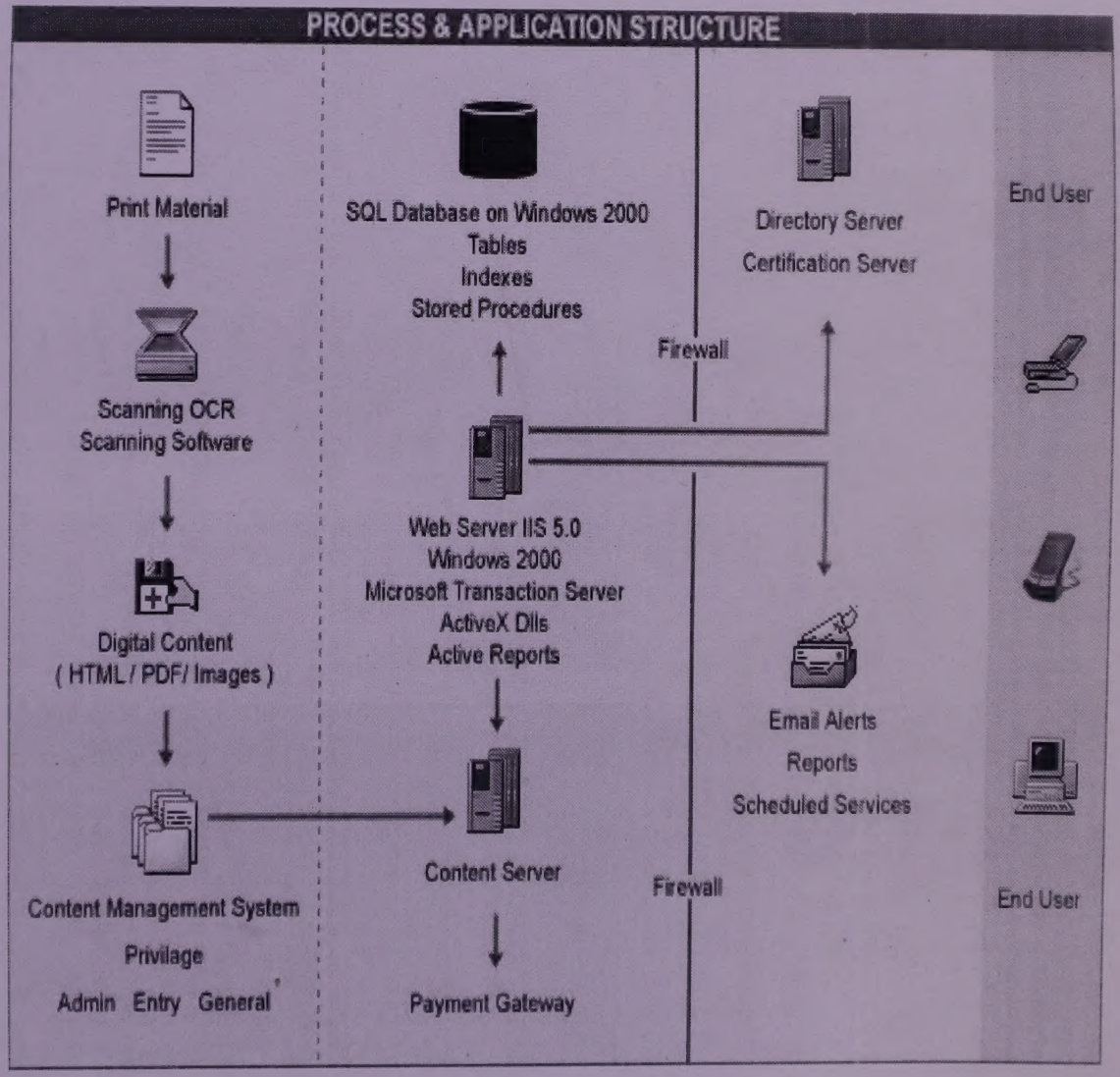


built ground up. The components would be COM components deployed within MTS. These components are completely isolated from presentation logic, which will be implemented using a set of Active server pages (ASP). The data stores (user, process etc.) will be implemented within an RDBMS environment.

In addition to the basic system, we will also add data analysis tools using reporting engines to work on the processed data. We propose to implement this functionality by building the query engines ground-up.

The technology platforms used to implement this solution are:

Client	Any Web Browser (e.g. IE, Netscape)
Web Server	IIS 5.0
Application Server	MTS
Database	SQL 2000
OS	Windows 2000
Independent User Administration Application	Web based
Data Interchange Format	Will be XML based
Messaging Server	Any SMTP compliant

One key process in the project would be scanning and digitizing the documents. This would need to be done efficiently and with high precision for the successful and timely completion of the project.

The full system as planned by Indegene is depicted in the diagram shown below